

# Chapter 1

## Introduction

### **Excess Phosphorus Levels in a Lake Can Cause Dense Blooms of Blue-Green Algae which Cause:**

- Murky green water
- Odors
- Depleted oxygen levels in the deep, cold water which can lead to fish kills

Phosphorus is a nutrient that controls the level of algae production in lakes. Algae are microscopic plants that grow suspended in the open water of the lake or in concentrated clumps around the shallow margins of the lakeshore. The amount of algae in the lake water affects the clarity of the water, as well as the amount of well oxygenated, cold water available to cold water fish species (trout and salmon) in the summer months. Low phosphorus concentrations yield clear lakes with plenty of deep, well oxygenated cold water. High phosphorus concentrations yield cloudy lakes and oxygen may be severely depleted or eliminated from the deep, cold water in the summer months. Very high concentrations cause dense blooms of blue-green algae, which turn the water a murky green and accumulate as an odorous scum along the shoreline (for more information about lakes and phosphorus see Appendix A).

Phosphorus, a common nutrient typically associated with soil particles and organic matter, mostly reaches the lake in stormwater runoff from the lake's watershed, the land area draining to the lake. Since the portion of stormwater phosphorus that support algae growth tends to be associated with small, lightweight soil particles, it is



*High phosphorus levels in lakes cause dense algae blooms, which can accumulate along the shoreline as shown above.*

easily carried by stormwater and can be delivered to the lake from anywhere in the watershed.

The amount of phosphorus reaching the lake depends on what the stormwater runs over on its way to the lake. For example, forested areas do not readily release phosphorus to stormwater due to duff and canopy coverage whereas developed areas, such as residential, commercial or industrial areas, contain high levels of phosphorus, which are readily released to stormwater runoff, yielding higher lake concentrations. Generally speaking, the more developed a lake's watershed is, the higher its phosphorus concentration will be (for more information about phosphorus sources and transport see Appendix A).

This volume addresses long-term phosphorus loadings to lakes by setting standards to limit phosphorus contributions from new developments, and outlines guidelines to meet these standards. It does not address the short term, often catastrophic, increase in stormwater phosphorus that can result from unmitigated soil erosion during the construction process (see Maine Erosion and Sediment Control BMPs (DEP, 2003) for information about addressing erosion from construction sites).

The standards in this volume focus on limiting, not preventing, phosphorus contributions from new developments to lakes and they are not likely to be applied to all new phosphorus sources in a lake's watershed. As such, the implementation of stormwater management alone may not be sufficient to prevent a noticeable decline in lake water quality. To effectively maintain lake water quality, the elimination of significant existing sources of phosphorus would be necessary.

Chapter 2 of this volume presents the basic phosphorus standard for new development.



*Forested areas such as this one do not readily release phosphorus to stormwater due to the duff and canopy coverage. Developed areas release the greatest amounts of phosphorus and need controls in place to limit phosphorus contributions.*

Chapters 3 through 6 present a procedure for new developments to meet the standard that can be used by developers and reviewing agencies (i.e. planning board). The Appendices provide detailed supporting information.